
TeleVideo[®] Remote Workstation Processor Technical Reference

PREFACE

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1. INTRODUCTION

GENERAL

The TeleVideo Remote Workstation Processor (RWP) consists of a case with power supply and four backplane slots. The RWP supports up to four TS 800R Remote Workstations. Each TS 800R Remote Workstation consists of an intelligent processor board, located in the remote workstation processor, and remotely-located TeleVideo 950 terminals. The terminals communicate with the RWP through modems. A diagram of a typical system configuration is shown in Figure 1-1.

The remote workstation processor gives processing capability to a 950 terminal, through the intelligent processor board, and through access to a TeleVideo service processor, such as the TS 806/20 or TS 816/40. The link between the 950 terminal and the remote workstation processor is RS-232C serial I/O, while the link between the remote workstation processor and the service processor is RS-422, TeleVideo Systems Service Processor Protocol.

The intelligent processor board contains a Z80A microprocessor, memory, and serial I/O devices. Standard main memory is 64 kilobytes, expandable to 128 kilobytes.

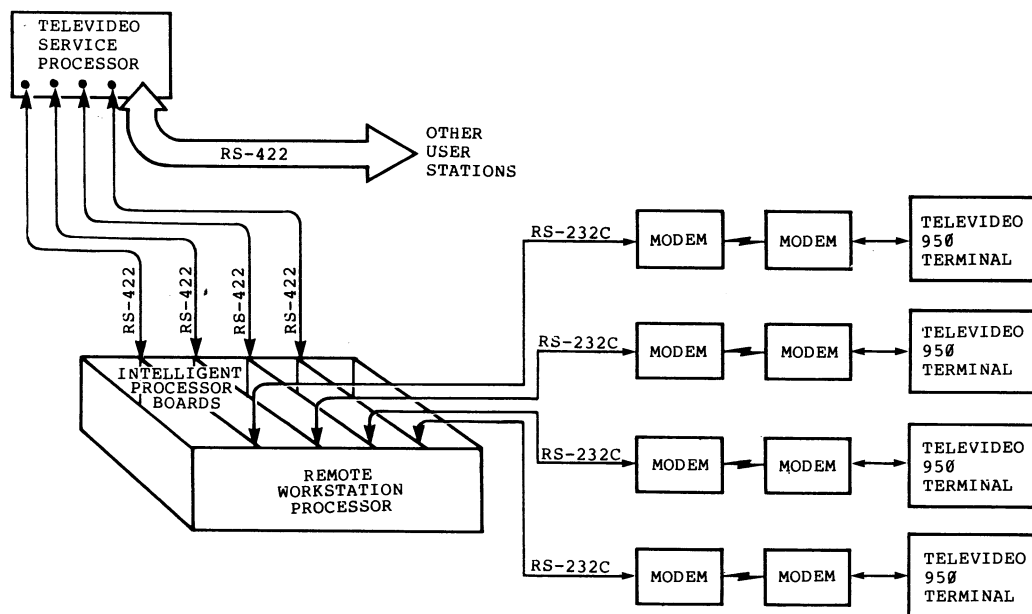


Figure 1-1. Remote Workstation Processor System Diagram

A BIZCOMP model 1012TV modem, manufactured by the Business Computer Corporation, may be purchased separately and mounted piggyback to the intelligent processor board. Due to power supply limitations, the BIZCOMP modem cannot be mounted inside the 950 terminal case. This modem is not supported by TeleVideo. Other modems, such as the Microbaud #80512, may be used external to the remote workstation processor or 950 terminal case. These modems are also purchased separately and are not supported by TeleVideo.

REFERENCES

The following publications contain information on the remote workstation processor.

- * Remote Workstation Processor User's Manual (TeleVideo)
- * TeleVideo Model 950 CRT Terminal Installation and User's Guide (TeleVideo)
- * TeleVideo 950 Terminal Maintenance Manual (TeleVideo)
- * Zilog Data Book (Zilog)

2. FUNCTIONAL DESCRIPTION

GENERAL

The RWP contains up to four intelligent processor boards. Figure 2-1 shows a block diagram of the RWP, with connectors to the intelligent processor board.

INTELLIGENT PROCESSOR BOARD

Each intelligent processor board contains a Zilog Z80A microprocessor, associated Z80A peripherals, RS-422 and RS-232C serial I/O channels, and up to two optional additional RS-232C serial I/O channels.

Central processor functions are carried out by a Z80A microprocessor. The CPU communicates with the system using a 16-bit address bus, and an 8-bit data bus. System interrupts are daisy chained with the CPU in the following priority order:

- | | | |
|-----------|---|----------------------------------|
| (highest) | 1 | Z80A DMA |
| | 2 | Z80A SIO (RS-422 Port) |
| | 3 | Z80A SIO (RS-232C Port) |
| | 4 | Z80A CTC |
| | 5 | Z80A DART (Channel A) (optional) |
| (lowest) | 6 | Z80A DART (Channel B) (optional) |

A Z80A DMA direct memory access controller device operates in burst mode to transfer data between memory locations, memory and the board serial I/O ports, and between serial I/O ports.

Main memory is configured in 64K x 1 dynamic RAM devices. Standard main memory is 64 kilobytes, expandable to 128 kilobytes. Standard read-only memory is a single 4K x 8 type 2732A EPROM device. This memory may be expanded to 8, 16, or 32K by using an additional EPROM socket and alternate devices, as shown in Table 2-1.

Table 2-1. Read-Only Memory Expansion

Device	SEL A	SEL B	Read-Only Memory Size	Address 1	Address 2
One 2732A	1	1	4K x 8	%1000	N/A
Two 2732A	1	1	8K x 8	%1000	%2000
One or Two 2764	0	1	16K x 8	%2000	%4000
One or Two 27128*	0	0	32K x 8	%4000	%8000

*Also cut trace A-B (W7), connect jumper C-D (W4)

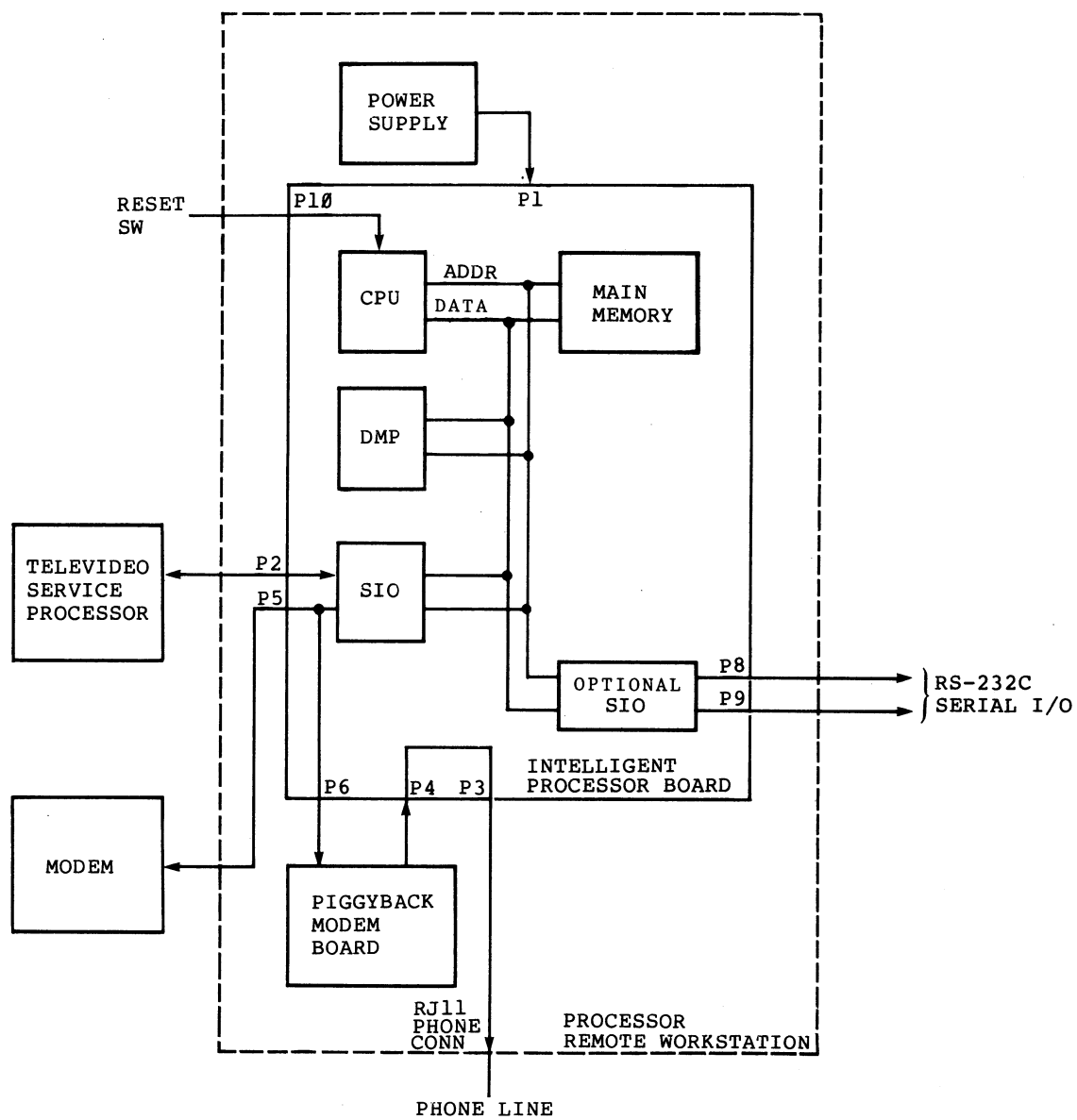


Figure 2-1. Remote Workstation Processor Block Diagram

The SEL A and SEL B lines referred to in Table 2-1 are traces adjacent to the memory control signals decoder. These lines must be cut or jumpered to produce the logic levels shown in the table. When 27128 EPROM devices are installed, the trace cuts and connections footnoted to the table allow decoding of address line AB13.

Main memory can be configured into one of four memory maps, as shown in Figure 2-2. The configuration is software selectable using the -PROM and -BANK 1 lines from the diagnostic LED decoder. When the -PROM line is active low, read-only memory is selected. When -BANK 1 is active low, bank 1 of memory is selected. The bank 2 memory, when selected by -BANK 1 high, occupies 56K of the CPU address space. When using bank 2, the 8K space from 56K through 64K remains in bank 1 to allow future implementation of the operating system.

Standard memory is shown in Figure 2-2A. Address 1 and Address 2 refer to the boundaries of installed read-only memory as listed in Table 2-1. If standard read-only memory is installed, it occupies the address space between 0 and 4K. The area between 4K and 8K is accessible only when a second 2732A is installed. For the 2764 and 27128 EPROM devices, the boundaries for each device are as shown in Table 2-1. Figure 2-2B shows the memory map with read-only memory de-selected, allowing the CPU to addresses all 64K of main memory.

Figure 2-2C shows the memory map with bank 2 and EPROM both selected. The CPU now addresses bank 2 of main memory, except for the upper 8K of space from %E000 through %FFFF which remains in bank 1. The boundaries for read-only memory are as shown in Table 2-1 for each type of EPROM device. Figure 2-2D shows the memory map with bank 2 selected and EPROM de-selected. Again, the upper 8K of space remains in bank 1. The remainder of the address space is in bank 2 of main memory.

I/O port enables are decoded in a 32 x 8 ROM decoder addressed from lines AB2 through AB7. Table 2-2 contains a summary of the I/O port address scheme for the intelligent processor board. Refer to the system User's Manual for detailed instructions on using these ports.

A single Z80 SIO device contains both the service processor interface and the user station interface. Channel A of the SIO contains the RS-422 synchronous SDLC link to the service processor. This channel operates according to the TeleVideo Systems Service Processor Protocol. Data is transmitted and received over this link at 800 kilobaud. Channel B of the SIO contains the RS-232C link to the user station. This channel is configured as a DTE unit for a modem. The modem outputs are

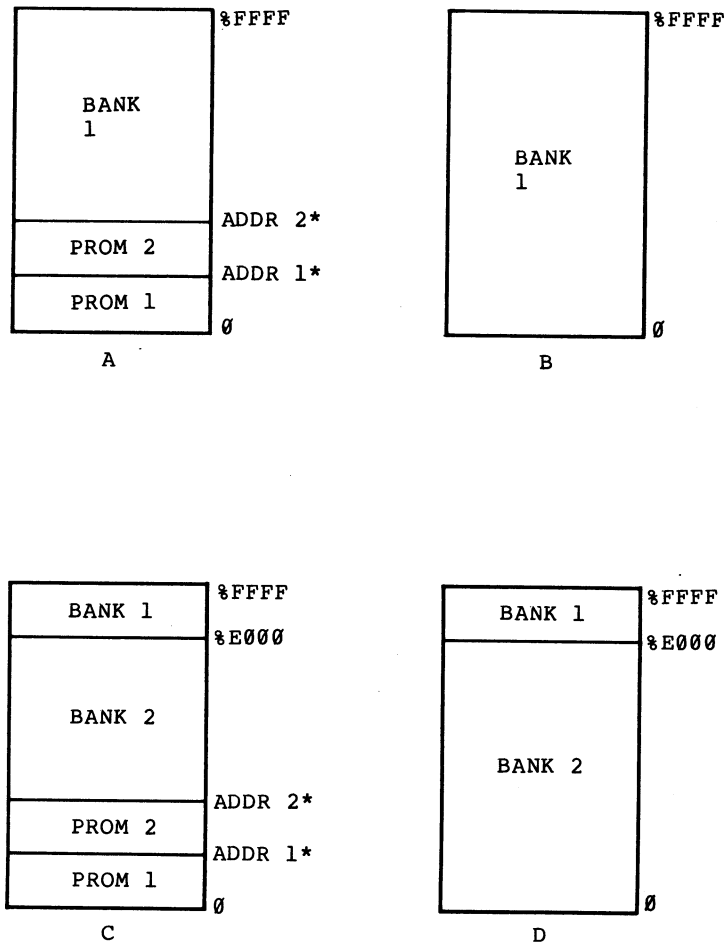


Figure 2-2. Memory Maps for Remote Workstation Processor

Table 2-2. I/O Port Addresses

Address	Description															
%00	Status Switch Buffer															
%08	CTC Channel 0															
%09	CTC Channel 1															
%0A	CTC Channel 2															
%0B	CTC Channel 3															
%0C	SIO Channel A Data (RS-422)															
%0D	SIO Channel B Data (RS-232C)															
%0E	SIO Channel A Control															
%0F	SIO Channel B Control															
%10	DMA Enable															
%20	DART Channel A Data (RS-232C)															
%21	DART Channel B Data (RS-232C)															
%22	DART Channel A Control															
%23	DART Channel B Control															
%60	Diagnostic LED Indicators 4 and 1 <table><tr><td><u>D0</u></td><td><u>D1</u></td><td><u>Indicator</u></td></tr><tr><td>1</td><td>1</td><td>Indicators off</td></tr><tr><td>0</td><td>1</td><td>Indicator 4 on</td></tr><tr><td>1</td><td>0</td><td>Indicator 1 on</td></tr><tr><td>0</td><td>0</td><td>Indicators on</td></tr></table>	<u>D0</u>	<u>D1</u>	<u>Indicator</u>	1	1	Indicators off	0	1	Indicator 4 on	1	0	Indicator 1 on	0	0	Indicators on
<u>D0</u>	<u>D1</u>	<u>Indicator</u>														
1	1	Indicators off														
0	1	Indicator 4 on														
1	0	Indicator 1 on														
0	0	Indicators on														
%61	Diagnostic LED Indicators 3 and 2; RS-422 Enable <table><tr><td><u>D0</u></td><td><u>D1</u></td><td><u>Indicator</u></td></tr><tr><td>1</td><td>1</td><td>Indicators off; RS-422 Enable</td></tr><tr><td>0</td><td>1</td><td>Indicator 3 on; RS-422 Enable</td></tr><tr><td>1</td><td>0</td><td>Indicator 2 on</td></tr><tr><td>0</td><td>0</td><td>Indicators on</td></tr></table>	<u>D0</u>	<u>D1</u>	<u>Indicator</u>	1	1	Indicators off; RS-422 Enable	0	1	Indicator 3 on; RS-422 Enable	1	0	Indicator 2 on	0	0	Indicators on
<u>D0</u>	<u>D1</u>	<u>Indicator</u>														
1	1	Indicators off; RS-422 Enable														
0	1	Indicator 3 on; RS-422 Enable														
1	0	Indicator 2 on														
0	0	Indicators on														
%62	Modem Sync/Async Select/Carrier Detect LED <table><tr><td><u>D0</u></td><td><u>D1</u></td><td><u>Function</u></td></tr><tr><td>0</td><td>-</td><td>Asynchronous Mode</td></tr><tr><td>1</td><td>-</td><td>Synchronous Mode</td></tr><tr><td>-</td><td>1</td><td>Front Panel Carrier Detect off</td></tr><tr><td>-</td><td>0</td><td>Front Panel Carrier Detect on</td></tr></table>	<u>D0</u>	<u>D1</u>	<u>Function</u>	0	-	Asynchronous Mode	1	-	Synchronous Mode	-	1	Front Panel Carrier Detect off	-	0	Front Panel Carrier Detect on
<u>D0</u>	<u>D1</u>	<u>Function</u>														
0	-	Asynchronous Mode														
1	-	Synchronous Mode														
-	1	Front Panel Carrier Detect off														
-	0	Front Panel Carrier Detect on														
%63	PROM Disable/Bank 2 Enable <table><tr><td><u>D0</u></td><td><u>D1</u></td><td><u>Function</u></td></tr><tr><td>0</td><td>-</td><td>PROM Enable</td></tr><tr><td>1</td><td>-</td><td>PROM Disable</td></tr><tr><td>-</td><td>0</td><td>Bank 2 Disable (Bank 1 Enable)</td></tr><tr><td>-</td><td>1</td><td>Bank 2 Enable (Bank 1 Disable)</td></tr></table>	<u>D0</u>	<u>D1</u>	<u>Function</u>	0	-	PROM Enable	1	-	PROM Disable	-	0	Bank 2 Disable (Bank 1 Enable)	-	1	Bank 2 Enable (Bank 1 Disable)
<u>D0</u>	<u>D1</u>	<u>Function</u>														
0	-	PROM Enable														
1	-	PROM Disable														
-	0	Bank 2 Disable (Bank 1 Enable)														
-	1	Bank 2 Enable (Bank 1 Disable)														
%68	Clear Break															

Table 2-3. Interval Timer Settings for Baud Rates

Baud Rate	16x Rate	Divisor
50	800	6144
75	1200	4096
110	1760	2793
135	2152	2284
150	2400	2048
300	4800	1024
600	9600	512
1200	19200	256
1800	28800	171
2000	32000	154
2400	38400	128
3600	57600	85
4800	76800	64
7200	115200	43
9600	153600	32
19200	307200	16

available internally on connector P6, or externally on connector P5. Circuits A, B, CA, CB, CF, DB, and DD are implemented to all full modem controls in either synchronous or asynchronous transmission modes. Baud rate for this channel is programmable to any standard data rate. Table 2-3 contains the CTC interval timer settings for each baud rate.

Two optional RS-232C serial I/O ports may be added to the board with the installation of a single Z80 DART device. These ports are asynchronous. Baud rates are programmable to standard rates as listed in Table 2-3. These channels are configured DCE, and are reserved for future use.

An 8-element DIP switch is included on the board for default configuration. This switch is read by the CPU as an I/O port through the status switch buffer. Settings for the DIP switch are given in the system User's Manual.

3. CIRCUIT DESCRIPTION

GENERAL

This section contains circuit descriptions of the major functional blocks on the intelligent processor board. A block diagram of the intelligent processor board is shown in Figure 3-1.

CLOCK GENERATOR

The major components of the clock generator are:

Y1	16 MHz Crystal-Controlled Oscillator
A59	Oscillator Divider
Q1	System Clock Driver
A61	Timer Clock Divider
A63	RS-422 Baud Rate Divider

The 16 MHz oscillator provides the source frequency, which is divided by the oscillator divider to a -20 signal of 8 MHz, and a system clock signal of 4MHz. The system clock signal is current amplified by the clock driver to become 0 and 0BF.

The 8MHz signal is divided in the timer clock divider to produce the clock triggers for the counter-timer device. Another divider uses -20 to produce BAUD RATE 422.

CENTRAL PROCESSOR UNIT

The major components of the central processor unit are:

A5	Zilog Z80A Microprocessor
A17,A18	Address Buffers
A25,A39	Type 2732A Read-Only Memory
A4	Zilog Z80A DMA Direct Memory Access
A1	Zilog Z80A CTC Counter-Timer

The central processor unit is based on the Z80A microprocessor. This device produces addresses on lines A0 through A15, which are buffered to become AB0 through AB15. Data is carried on data bus lines D0 through D7.

A Z80A DMA device handles direct memory access transfer of data between memory locations and the RS-422 serial I/O port. This device is operated in the burst mode through interrupts to the microprocessor. After the interrupt is acknowledged the DMA requests the bus. When the bus is granted, the transfer is accomplished and the DMA releases the bus. This transfer does not interfere with memory refresh.

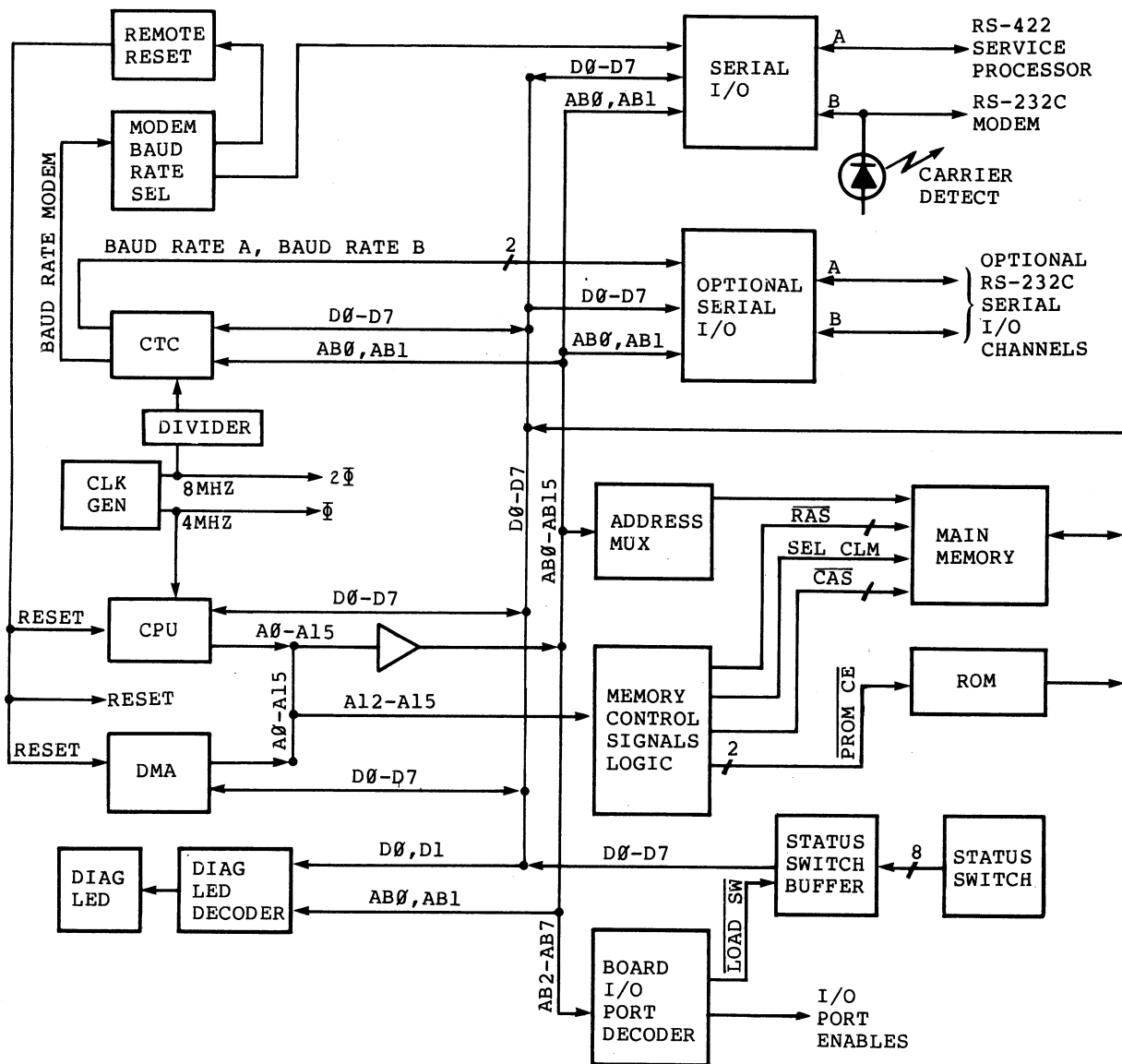


Figure 3-1. Intelligent Processor Board Block Diagram

Counter-timer functions, including a time-of-day clock interrupt and programmable baud rates, are carried out in a Z80A CTC device under microprocessor control.

MAIN MEMORY

The major components of main memory are:

A20	Memory Control Signals Decoder
A45,A54	Control Signals State Machine
A3,A10,A16, A24,A32,A38 A44,A50	Bank 1 Main Memory
A2,A9,A15, A23,A31,A37, A43,A50	Bank 2 Main Memory (optional)
A52,A53	Memory Address Multiplexer

The memory control signals decoder is addressed on lines A12 through A15, and on lines -PROM and -BANK1. The decoder selects between the two banks of memory using the row address signals -RAS1 and -RAS2, and between the two read-only memory devices on lines -PROM1CE and -PROM2CE, to produce the memory maps described in section 2. An additional decoder signal, -WAIT, is produced automatically with each read-only memory access.

For a memory access, the control signals state machine is held preset by MREQBF not true. When MREQBF is raised, it releases the preset state. The combination of the Q output of the third flip-flop, plus MREQBF and the bank select signal, produces -RAS. The next clocks produce the SEL CLM and -CAS signals by successively clocking through the not true state of RFSH BF. When MREQBF is released, the state machine returns to its preset state.

For memory refresh, the RFSH BF signal goes high to hold the state machine preset, while the inverted refresh signal locks out the bank select signals. With both bank select signals, plus the third flip-flop signal held high, MREQBF high activates -RAS for both banks to accomplish the refresh.

To select read-only memory, the -PROM signal is set high to enable ROM selection, and the -BANK signal selects the device. With MREQBF high, the addressed device is enabled.

Main memory consists of type 8264 memory devices, each device containing 64 kilobits of storage. Standard memory is contained in a single bank of 64 kilobytes, which may be optionally expanded to 128 kilobytes. The memory control logic signals, and the multiplexed address, produce the read or write memory access on data lines D0 through D7.

DECODERS

The major decoder components are:

A14	I/O Port Decoder
A36	Diagnostic LED Decoder
A8	Status Switch Buffer
S1	Status Switch Pack

The I/O port decoder decodes lines AB2 through AB7 to produce I/O device enables. The port addresses for this decoder are listed in Table 2-2.

The diagnostic LED decoder is enabled as a port address of the I/O port decoder, and is written to using the -IOWR signal of the CPU. The diagnostic LED decoder uses lines A0 and A1, and D0 and D1 to activate the diagnostic LED devices as listed in Table 2-2. In addition, this decoder produces the -ASYNC signal to change the RS-232C modem signal clock source to support synchronous or asynchronous modes, the -LED5 signal to software activate the front panel CARRIER DETECT indicator, and the two memory control signals, -PROM and -BANK1.

The status switch buffer enables the settings of the 8-section status switch pack onto data bus lines D0 through D7. The buffer is an output port of the I/O port decoder and is read with the CPU control signal, -IORD. Settings for the switch pack are given in the system User's Manual.

SERIAL I/O

The standard intelligent processor board contains a single serial I/O device with two channels: one for RS-422 communication with the service processor, and one for RS-232C communication with a terminal or modem. An additional serial I/O device may be optionally installed to provide two RS-232C channels for a printer or general purpose.

The major serial I/O components are:

A35	Z80A SIO Serial I/O Device
A28	Differential Line Receiver
A34	Differential Line Transmitter
A46	Modem Data Line Receiver
A55	Modem Clock Line Receiver
A47	Modem Baud Rate Selector
A42	Modem Line Driver
A57	Remote Reset Counter
A45	Remote Reset Latch

An RS-422 serial I/O port is contained in channel A of a Z80A SIO. This channel is set up for synchronous communication using SDLC protocol at initialization. Transfer of data between this port and main memory is interrupt-driven through Z80A DMA device

direct memory access. Differential data transmission through the SIO is supported by a differential line receiver and a differential line transmitter.

Channel B of the SIO is configured as an RS-232C serial I/O channel for DTE operation with a modem. This channel contains provisions for connecting to a back-panel connector, or to a piggyback modem board. The piggyback modem is not supported by TeleVideo.

Separate line receivers are used for incoming data and clock signals. The output of the clock line receiver is applied to a modem baud rate selector, which allows either the modem signal in synchronous operation, or the programmable baud rate clock in asynchronous operation, to clock the SIO device. The SIO output is passed through a line driver to the modem.

The modem baud rate selector also interacts with the remote reset circuit. When in asynchronous mode, with the CTC supplying the baud rate clock, the occurrence of two successive twelve character period breaks without CPU intervention causes a general reset of the board.

The character periods are counted in the remote reset counter. As long as data is coming into the SIO, the counter is held cleared. When data stops, and there is carrier activity, the counter begins counting. If data does not return during the counting period to clear the counter, the clock pin of the remote reset latch is set low. Return of data clears both sections of the counter, and clocks the latch. If the CPU does not reset the latch by writing to the -CLR BREAK I/O port line, the second break of twelve characters generates a reset through a NAND function of the set latch and the inverted twelve count signal. This reset is passed through the modem baud rate selector to activate the -REMOTE RESET line and reset the board.

OPTIONAL SERIAL I/O CHANNELS

The major components of the optional serial I/O channels are:

A13	280A DART Dual Asynchronous Receiver-Transmitter
A7,A29	Line Receivers
A12,A22	Line Drivers

Two channels of RS-232C serial I/O may be added to the intelligent processor board by installation of an additional SIO device. These channels are configured as DCE ports in asynchronous-only operation. Each channel is programmed with separate baud rate lines from the CTC. Separate line receivers and line drivers are provided for each channel.

4. SYSTEM MAINTENANCE

GENERAL

The intelligent processor board contains self test diagnostics that are automatically run during system initialization at power-up. These diagnostics light LED indicators on the board and on the RWP front panel. When the test are completed successfully, the board loads the operating system. The diagnostic LED indicators are not visible with the RWP case closed.

A special set of diagnostics for the system is available from TeleVideo. These diagnostics provide a more detailed check of the system, with error messages that closely isolate a malfunction.

INITIALIZATION AND SELF-TEST DIAGNOSTICS

At power-on, the intelligent processor board begins executing its self-test diagnostics. First, interrupts are turned off and the remote reset latch is cleared. All diagnostic indicators are turned off. The processor then jumps to a data line and modified march test on both banks of memory. During this test diagnostic LED 1 and the front panel indicator are both lit.

The data line test loads a data byte into main memory starting at location %4000 and continuing through to %FFFF. The byte is then read back and compared for error. If there is no error, the byte is incremented and compared again until each bit of the memory location byte has been checked.

The march test fills memory from locations %4000 through %FFFF with a test pattern, then verifies the pattern, complements it, and verifies the pattern again. When completed for the first bank, the second bank is checked, if installed. During the second bank memory tests, indicators 1 and 2 are both lit, and the front panel indicator is off.

Failure of the memory test halts the diagnostics, and blinks the front panel indicator. For bank 1, indicator 1 remains lit to specify the failed test; for bank 2, indicators 1 and 2 remain lit. When the tests are successfully completed for all installed memory, the bank 1 is switched in, the indicators go out, and the processor moves to the next test.

Start of the DMA test is signalled when diagnostic LED 3 and the front panel indicator both light. This test performs a memory-to-memory move with the DMA programmed to interrupt on end of block. The size and locations of the source and destination blocks are programmed into the DMA device, the DMA is

initialized, and the move is started. After the move, the processor compares both blocks of memory by checking each location in turn. Failure of the DMA test is indicated when the test halts, indicator 3 remains lit, and the front panel indicator blinks. Successful completion is signalled when both indicator 3 and the front panel indicator go out and the processor moves to the next test.

The SIO test is run on channel B (RS-232C, modem) of the SIO. This test writes and verifies an interrupt vector to the device. The test is signalled when diagnostic LEDs 1 and 2 and the front panel indicator all light. First, SIO register 1 is written with a data pattern to prevent it from affecting the test. Next, the interrupt vector is loaded to status register 2. This register is now read back, and if there is an error, the CPU halts, indicators 1 and 2 remain lit, and the front panel indicator blinks. If no error, the SIO is reset, and the processor moves on to the next test.

The final test uses channel 1 of the CTC to perform a CPU interrupt. This test is signalled when diagnostic LED 4 and the front panel indicator both light. Channels 0 and 1 of the CTC are initially reset, and the interrupt vector address is programmed into the CTC. Channel 1 is given a command word and time constant, and the CPU performs a delay routine. After the delay, channel 1 is reset, and the CPU checks its interrupt flag. If there is no interrupt, the test halts, indicator 4 remains lit, and the front panel indicator blinks. Successful completion is signalled when both indicator 4 and the front panel indicator go out. The processor now blinks all diagnostic indicators and the front panel indicator once, and goes to the bootstrap routine.

In the bootstrap routine, the DMA and SIO devices are initialized, and the board is set up for SDLC protocol. The board sends a request block for booting the operating system to the service processor, and if successful, completes the operating system boot routine. Errors during this routine cause a reset of the DMA, SIO READY line, and SIO status register error flags. The SIO is shut down and the CPU loops on the subroutine that caused the error.

A:CONNECTOR PIN ASSIGNMENTS

CONNECTOR P1 (POWER SUPPLY)

PIN NUMBER	SIGNAL DESIGNATOR	SIGNAL DESCRIPTION
1	-12V	-12 Volts
2	-----	not used
3	GND	Ground
4	+5V	+5 Volts
5	+12V	+12 Volts

CONNECTOR P2 (RS-422 SERIAL I/O)

PIN NUMBER	RS-422 DESIGNATOR	RS-422 DESCRIPTION
1	GND	Chassis Ground
2	TxD	Transmit Data +
3	RxD	Receive Data +
4	RTS	Request to Send +
5	CTS	Clear to Send +
6	-TxC	Transmit Clock -
7	-RxC	Receive Clock -
8	GND	Signal Ground
9	-TxD	Transmit Data -
10	-RxD	Receive Data -
11	-RTS	Request to Send -
12	-CTS	Clear to Send -
13	TxD	Transmit Clock +
14	RxC	Receive Clock +
15	TEST	Test

CONNECTOR P3
(RJ11 PHONE JACK)

PIN NUMBER	SIGNAL DESIGNATOR	SIGNAL DESCRIPTION
1	---	not used
2	---	not used
3	RING	Ring
4	TIP	Tip
5	---	not used
6	---	not used

CONNECTOR P4
(INTERNAL MODEM PHONE LINE)

PIN NUMBER	SIGNAL DESIGNATOR	SIGNAL DESCRIPTION
1	RING	Ring
2	TIP	Tip

CONNECTORS P5, P8, P9
(RS-232C SERIAL I/O)

PIN NUMBER	RS-232C DESIGNATOR	RS-232C DESCRIPTION	P5	P8,P9
1	AA	Protective Ground	GND	GND
2	BA	Transmitted Data	TXD	RXD
3	BB	Received Data	RXD	TXD
4	CA	Request to Send	RTS	RTS
5	CB	Clear to Send	CTS	CTS
6	CC	Data Set Ready		DSR
7	BA	Signal Ground	GND	GND
8	CF	Data Carrier Detect	DCD	DCD
15	DB	Transmit Clock	TxC	
17	DD	Receive Clock	RxC	
20	CD	Data Terminal Ready	DTR	

CONNECTOR P6
(INTERNAL MODEM)

PIN NUMBER	SIGNAL DESIGNATOR	SIGNAL DESCRIPTION
1	GROUND	Ground
2	+5V	+5 Volts
3	-12V	-12 Volts
4	---	not used
5	RXD AUX	Received Data
6	TXD AUX	Transmit Data
7	+12V	+12 Volts
8	CTS AUX	Clear to Send
9	---	not used
10	DCD AUX	Data Carrier Detect
11	SYNC/ASYNC	Mode Control
12	---	not used
13	TXC	Transmit Clock
14	GROUND	Ground
15	+5V	+5 Volts
16	-12V	-12 Volts
17	---	not used
18	CLK MOD	Modem Data Clock
19	---	not used
20	+12V	+12 Volts
21	---	not used
22	DTR AUX	Data Terminal Ready
23	---	not used
24	---	not used
25	RXC	Receive Clock
26	---	not used

CONNECTOR P10
(RESET)

PIN NUMBER	SIGNAL DESIGNATOR	SIGNAL DESCRIPTION
1	---	not used
2	---	not used
3	RESET	Reset
4	GROUND	Ground
5	---	not used

B:SYSTEM REPAIR PRICE AND SPARE PARTS PRICE LISTS

This section contains the Repair Price List for Computers and the Systems Spare Parts Price List in effect at the printing date of this manual. Use these lists for estimating repairs: prices are subject to change without prior notice.

Repairs Price List for Computers

March 1, 1983

DESCRIPTION	PRICE
Logic Board TS 800 (Obsolete)	\$ 135.00
Logic Board TS 800A, 802, 802H	150.00
Logic Board TS 801 (Obsolete)	175.00
Logic Board TS 806, 806/20	250.00
Logic Board TS 816, 816/40	350.00
Logic Board TS 1602G, 1602GH	400.00
Graphics Board TS 1602G, 1602GH	175.00
Floppy Controller (Daughter Board) TS 802, 802H	50.00
Winchester Disk Controller (5" Drive & 40MB 8" Drive)	175.00
Tape Controller TS 806C	95.00
Interface Board TS 816U	50.00
Keyboard TS 800, 800A, 802, 802H	50.00
Keyboard TS 1602G, 1602GH	50.00
Power Supply Module TS 800, 800A	50.00
Power Supply TS 802, 802H, 806, 806H, 816, 1602G	110.00
Video Module TS 800, 800A, 802, 802H, 1602G, 1602GH	50.00
Floppy Disk Drive 5"	160.00
Winchester Disk Drive 5"	160.00
Winchester Disk Drive 8"	450.00
Tape Drive	300.00
Picture Tube Broken P31	214.00
Picture Tube Broken P39	230.00
Top Case Broken TS 802, 800A, 1602G	80.00
Bottom Case Broken TS 802, 800A, 1602G	100.00
Top or Bottom Case Broken Computer Boxes TS 806, 816	80.00
Front or Rear Panel Broken	60.00
Basic Repair charge (This additional amount charged when an entire system is returned for repair)	70.00

TeleVideo will bill per above price schedule when no trouble is found in the module returned for repair.

Out of Warranty

Customer to return defective replaceable module freight prepaid to the factory, 1170 Morse Avenue, Sunnyvale, CA 94086. TeleVideo will send replacement repaired module, billing per above price schedule plus return freight.

Prices subject to change without notice.

 **TeleVideo Systems, Inc.**

1170 Morse Avenue • Sunnyvale, CA 94086

Eastern Region — (212) 308-0705 • Northeast Region — (617) 369-9370 • Midwest Region — (312) 969-0112
 South Central Region — (214) 258-6776 • Southwest Region — (714) 752-9488 • Northwest Region — (408) 745-7760
 Southeast Region — (404) 447-1231 • European Sales — (31) 075-28-7461 TLX:844-19122
 U.K./Scandinavian Sales — (44) 0908-668778 TLX:851-825151

Systems Spare Parts Price List

TELEVIDEO COMPUTER SYSTEMS
SPARE PARTS PRICE LIST

05-10-83

PART NUMBER	PRICE	DESCRIPTION
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MANUALS [class A]

2004200	20.00	Guide, Installation & User's TS 800A
2003700	20.00	Guide, Installation & User's TS 802
2003900	20.00	Guide, Installation & User's TS 802H
2248100	20.00	Guide, Installation & User's TS 803
2133700	20.00	Guide, Installation & User's TS 1602G
2133800	20.00	Guide, Installation & User's TS 1602GH
2248600	20.00	Guide, Installation & User's TS 1603
2003000	10.00	Guide, Installation & User's TS 806
2226500	20.00	Guide, Installation & User's TS 806/20
2004700	10.00	Guide, Installation & User's TS 806C
2002300	10.00	Guide, Installation & User's TS 806H
2232000	20.00	Guide, Installation & User's TS 806H/20
2004100	10.00	Guide, Installation & User's TS 816
2226400	20.00	Guide, Installation & User's TS 816/40
2150300	50.00	Guide, User's TELEPLAN
2200200	20.00	Manual, Operator's Tele3780
2219700	40.00	Manual, TeleDBMS
2003200	25.00	Manual, Mmmost
2003400	50.00	Manual, CP/M
2162400	50.00	Manual, CPM/86
2150400	40.00	Manual, TeleVideo - COBOL
2133900	50.00	Manual, Maintenance TS 800A, 802, 802H
2230700	50.00	Manual, Maintenance TS 806/20, 806, 806C & H
2131400	50.00	Manual, Maintenance TS 816
2259000	50.00	Manual, Maintenance TS 1602G/GH
2291000	50.00	Manual, Maintenance TS 803

KITS [class B]

2000700	300.12	Kit, Spare Parts, Logic Board 8 Bit Systems *
2252100	703.50	Kit, Spare Parts, Logic Board 16 Bit Systems *
2202900	244.80	Kit, Spare Parts, Logic Board WDC *
2203000	199.59	Kit, Spare Parts, Logic Board FDC *
2252000	401.40	Kit, Spare Parts, Graphics Board TS 1602G *
2280700	153.28	Kit, Spare Parts, Video Mod ts 800A *
2202800	90.88	Kit, Spare Parts, Mechanical TS 802/800A*
2228400	235.72	Kit, Spare Parts, Data Cables TS 816's*
2270800	223.08	Kit, Spare Parts, Data Cbels TS 806 & User Stat *

* Contents of Kits at end of List

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 PART PRICE DESCRIPTION
 NUMBER

MAJOR ASSEMBLIES/PRINTED CIRCUIT BOARDS [class B]

2198900	1,474.14	PCB Asy Mod 8" Flpy TS 801
2018000	1,199.67	PCB Asy Logic Board TS 800A,802
2018001	1,199.67	PCB Asy Logic Board TS 802H
2226000	1,047.78	PCB Asy Logic Board TS 803,800
2020400	2,157.93	PCB Asy Logic Board TS 1602G
2022000	1,529.10	PCB Asy Logic Board TS 1603
2012000	1,251.12	PCB Asy Logic Board TS 806 TS 806/20
2017501	658.32	PCB Asy Logic Board TS 806C
2012500	1,765.83	PCB Asy Logic Board TS 816
2012501	1,403.05	PCB Asy Logic Board TS 816/40
2013000	360.00	PCB Asy Logic Board TS 816U
2195800	93.00	Video Module TS 800A,802
2226900	72.00	Video Module TS 803,1603
2013500	866.19	PCB Asy 5" Winchester Disk Controller (806, 806/20)
2013501	866.19	PCB Asy 8" Winchester Disk Controller (816/40)
2017000	210.75	PCB Asy Floppy Disk Cont TS 802 (Daughter Bd)
2019000	656.87	PCB Asy Graphics TS 1602G
2109200	654.00	Power Supply Switching 100W TS 806,806/20
2109201	827.34	Power Supply Switching 150W TS 802,802H,1602G
2129202	954.00	Power Suppy Switching 200W TS 816,806C
2191500	103.00	Power Supply 3A/5V TS 800A (TS 800 OBS)
2227500	275.04	Power Supply 120W TS 803,1603
2227400	63.84	Power Supply Transformer TS 1603,803
2304000	288.00	Power Supply (OPC) TS 1602/SGH,802S
2304800	288.00	Power Supply (OPC) TS 803H,1603H
2294000	288.00	Power Supply (OPC) TS 806S/20
2299100	324.84	Power Supply (OPC) TS 816/40

STORAGE DEVICES [class C]

2099200	591.00	Floppy Drive 48 TPI D/S 5 1/4"	.5	MB	Full Height
2221300	399.00	Floppy Drive 48 TPI D/S 5 1/4"	.5	MB	Half Height
2252300	489.00	Floppy Drive 96 TPI D/S 5 1/4"	1.0	MB	Half Height
2198800	1,800.00	Disk Drive Winchester 5 1/4"	20	MB	
2099400	4,140.00	Disk Drive Winchester 8"	23	MB	
2220300	4,575.00	Disk Drive Winchester 115V 8"	40	MB	
2220100	4,575.00	Disk Drive Winchester 230V 8"	40	MB	
2099500	2,100.00	Tape Drive W/Codec Bd	14	MB	

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PART NUMBER	PRICE	DESCRIPTION
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MISC. MAJOR PARTS [class D]

2049300	179.00	Picture Tube Black/Green 12" P31
2173800	192.00	Picture Tube Black/Green 12" P39 Graphics (1602G)
2218700	192.00	Picture Tube Black/Green 14" P31P
2090200	175.00	Detachable Keyboard TS 800A/802 *
2183701	210.00	Detachable Keyboard TS 1602G *
2183700	210.00	Detachable Keyboard TS 803/1603 *
2099800	70.20	Case Bottom TS 806/806-20/RWP
2099900	70.20	Case Top TS 806/806-20/RWP
2100600	110.00	Case Top TS 802/1602G
2100700	85.00	Case Bottom TS 802/1602G
2100800	40.00	Bezel TS 802/1602G
2141700	70.20	Case Bottom TS 800A
2141800	97.80	Case Top TS 800A
2141900	20.00	Bezel TS 800A
2103100	70.00	Case Top TS 816/816-40
2103200	180.00	Case Bottom TS 816/816-40
2188300	16.32	Case Back Cover Crt TS 803/1603
2188500	71.16	Case Main Elect. TS 803/1603
2188600	66.00	Case CRT TS 803/1603
2188800	15.48	Bezel TS 803/1603
2189100	10.68	Case Arm Top TS 803/1603
2189200	.12	Case Arm Bottom TS 803/1603
2218800	1.44	Thumb Wheel Adj TS 803/1603
2291100	26.10	Power Cord TS 803/1603

* ORDER APPROPRIATE LABELS FROM LABELS/LOGO'S (PAGE 7)

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PART PRICE DESCRIPTION

NUMBER

FIRMWARE

8000002	16.92	IC 2332 Char Gen Upper Character Cell
8000003	16.92	IC 2332 Char Gen Lower Character Cell
8000009	23.28	IC 8048 With Program ROM for Keyboard TS 800A/802
8000016	15.0	IC character Gen. for Graphics Systems
8000018	34.50	IC 2716 System Program EPROM Kybd TS 800A/802
8000045	37.50	IC System Program EPROM Z80 Portion TS 800A/802
8000046	37.50	IC System Program EPROM Lower Terminal Firmware
8000047	37.50	IC System Program EPROM Higher Terminal Firmware
8000050	37.50	IC System Program EPROM Z80 Portion TS 802H
8000024	55.80	IC System Program EPROM 450ns TS 806
8000053	30.90	IC System Program EPROM 450ns TS 816
8000106	30.90	IC System Program EPROM 450ns TS 816/40
8000054	30.90	IC System Program EPROM 450ns TS 806C
8000093	24.00	IC System Program EPROM 450ns TS 1602G/GH
8000080	5.40	IC Memory Decode TS 1602G
8000079	5.40	IC I/O Decode TS 1602G
8000027	55.80	IC Diagnostic EPROM TS 806
8000052	55.80	IC Diagnostic EPROM TS 806C
8000096	55.80	IC Diagnostic EPROM TS 816
8000107	55.80	IC Diagnostic EPROM TS 816/40
8000035	23.70	IC L2-7 System Program ROM WDC (74S472 512 X 8)
8000036	23.70	IC MX-7 System Program ROM WDC (74S472 512 X 8)
8000037	23.70	IC FX-7 System Program ROM WDC (74S472 512 X 8)
8100024	100.00	Listing System Program TS 806 *
8100045	100.00	Listing 800A, 802, [Z80 Portion] *
8100046	500.00	Listing 800A, 802, 802H [6502 Portion] *
8100050	100.00	Listing TS 802H [Z80 Portion] *
8100053	100.00	Listing System Program EPROM TS 816 W/Code *
8100054	100.00	Listing System Program EPROM TS 806C *
8100093	100.00	Listing System Program EPROM TS 1602G/GH *

* Require non-disclosure agreements and letter of intended use.

CABLES/CONNECTORS/WIRE ASSEMBLIES

2005700	25.44	Cbl Asy, Keyboard TS 800A/802
2006800	14.22	Cbl Asy, 20 Pin 12" TS 802H WDC To Winchester
2006900	18.60	Cbl Asy, 34 Pin 15" TS 802H Daughter Bd/Floppy WDC/Winch
2007001	32.28	Cbl Asy, 40 Pin 16" TS 802H Daughter Bd To WDC
2007300	29.16	Cbl Asy, 34 Pin 14" TS 802 Daughter Bd To Floppy
2006100	11.88	Cbl Asy, 40 Pin 2" TS 802/H Logic to Daughter Bd
2006901	18.96	Cbl Asy, 34 Pin TS 806 Logic To Floppy/WDC To Winch
2007000	20.28	Cbl Asy, 40 Pin 13" TS 806 Logic To WDC
2006801	14.52	Cbl Asy, 20 Pin 15" TS 806-816/40 WDC To Winchester
2006501	11.34	Cbl Asy, 16 Pin 8" TS 806 RS 422 To Logic
2006600	36.00	Cbl Asy, 34 Pin 7" TS 806 Parallel Printer
2006400	24.12	Cbl Asy, 50 Pin 16" TS 816 WDC To Winchester

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PART NUMBER	PRICE	DESCRIPTION
2006201	20.10	Cbl Asy, 14" TS 816U To Logic, Logic To Tape
2006601	30.54	Cbl Asy, 34 Pin 8" TS 816 Parallel Printer
2006500	32.70	Cbl Asy, 16 Pin 3" TS 806C RS 422 Internal
2007100	51.00	Cbl Asy, 50 Pin 3" TS 806C Logic Board To Tape Drive
2007101	42.00	Cbl Asy, 20 Pin 12" TS 806 Internal For TS 806H
2007800	73.08	Cbl Asy, 34 Pin 16" TS 806 Internal For TS 806H
2128500	19.32	Cbl Asy, 20 Pin 10" TS 806H External to TS 806
2006300	23.40	Cbl Asy, 34 Pin 10" TS 806H External to TS 806
2007600	42.60	Cbl Asy, 20 Pin 12" TS 806H Internal for Winchester
2007700	54.00	Cbl Asy, 34 Pin 10" TS 806H Internal for Winchester
2135700	15.84	Cbl Asy, 50 Pin TS 1602G Logic to Graphics
2007002	38.22	Cbl Asy, 40 Pin 21" TS 816/40 Logic to WDC
2006204	27.42	Cbl Asy, 50 Pin 10" TS 816/40 Logic to Tape/Logic to 816U
2006200	21.30	Cbl Asy, 50 Pin 8" TS 816/40 Logic to WDC
2006404	31.50	Cbl Asy, 50 Pin 22" TS 816/40 WDC to Winchester
2224300	28.00	Cbl Asy, 34 Pin 4" TS 816/40 Parallel Printer
2235400	81.60	Cbl Asy, 25 Pin TS 816/40H External to TS 816/40
2160700	158.46	Cbl Asy, 50 Pin TS 816/40H External to TS 816/40
2235500	39.72	Cbl Asy, 25/20 Pin TS 816/40 Internal for TS 816/40H
2160800	150.06	Cbl Asy, 50/57 Pin TS 816/40 Internal for TS 816/40H
2161000	57.66	Cbl Asy, 50/57 Pin TS 816/40H Internal for Winchester
2235600	42.36	Cbl Asy, 25/20 Pin TS 816/40H Internal for Winchester
2008600	28.00	Harness Asy, Power TS 802H
2007900	28.00	Harness Asy, Power Cable 16" TS 806
2136500	28.00	Harness Asy, Power Cable 12" TS 806
2008000	12.84	Harness Asy, Power Cable 24" TS 816
2008101	69.60	Harness Asy, Tape Cassette Power-1
2008201	28.08	Harness Asy, Tape Cassette Power-2
2176200	50.00	Harness Asy, Power TS 816
2008800	28.00	Harness Asy, Winchester Serv. Board TS 816
2008900	28.00	Harness Asy, Tape Cassette Power 1 & 2
2136702	41.88	Harness Asy, TS 816/40
2192901	40.44	Harness Asy, TS 816/40
2008400	10.20	Harness Asy, 1.00 Reset Switch 3 Pin 14"
2008401	20.40	Harness Asy, 1.00 Reset Switch 3 Pin 15"
2008700	30.36	Harness Asy, Power Floppy General 14"
2097900	2.22	RJ11 Connector Female PCB Mount (AMP)
2141200	3.89	RJ12 Connector Female PCB Mount 6 Pin
2208400	2.82	RJ12 Modular Jack
2098000	9.60	Connector 15 Pin D-Sub Female PCB Mount RS422
2163100	24.24	Connector 15 Pin S-Sub Metal Female PCB Mount RS422
2097800	10.62	Connector 25 Pin D-Sub Female PCB Mount RS232
2165300	29.04	Connector 25 Pin D-Sub Metal Female PCB Mount RS232
2098100	.72	Connector 3 Pin Header - Straight
2216400	1.92	Connector 10 Pin Header - Straight
2098103	3.06	Connector 16 Pin Header - Straight
2098104	2.76	Connector 20 Pin Header - Straight
2098106	4.56	Connector 34 Pin Header - Straight
2098107	4.68	Connector 40 Pin Header - Straight
2098108	7.56	Connector 50 Pin Header - Straight

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PART NUMBER	PRICE	DESCRIPTION

2174401	8.10	Connector 50 Pin Header - Angle
2098300	1.80	Connector 2 Position Jumper
2098703	1.74	Connector 2 Pin Right Angle Molex
2098800	.72	Connector 2 Pin Straight Wafer
2098801	3.72	Connector 3 Pin Straight Wafer
2098802	.72	Connector 5 Pin Straight Wafer
2098700	1.02	Plug 5 Pin Molex Right Angle Wafer
2001200	11.34	Jack Socket Connector Kit
2109000	19.87	Power Cord 3 Conductor 3 Prong 6 FT

CRYSTALS

2098602	6.60	Crystal 1.8432 MHz	
2216500	18.00	Crystal 4 MHz	
2098603	4.80	Crystal 8.0000 MHz	
2098605	3.54	Crystal 13.6080 MHz	
2048800	18.00	Crystal 15 MHz	
2042800	27.00	Crystal 16 MHz	(MOT, CTS, HYT)
2098604	4.50	Crystal 20.000 MHz	
2035200	37.08	Crystal 23.814 MHz K1114A	(MOT, CTS)
2099700	1.02	Insulator Mounting Pad For Crystal	

FANS

2099000	35.28	Fan 115V/230V AC 36-47 CFM (AIR OVER)
2141500	52.50	Fan Box 230V AC TS 802/802H
2245800	56.28	Fan Box 115V AC TS 1602G/GH
2245700	67.20	Fan Box 230V AC TS 1602G/GH

BEZEL'S/CASE ASSEMBLIES

2142000	40.00	Panel Front	TS 806
2142100	40.00	Panel Front	TS 806C
2142200	40.00	Panel Front	TS 806H
2105401	40.00	Panel Back	TS 806
2105500	40.00	Panel Back	TS 816
2105600	40.00	Panel Front	TS 816
2100102	10.00	Shroud Connector	TS 800A
2100500	10.00	Shroud Connector	TS 802/1602G
2219800	5.00	Card Guide	TS 802
2100300	15.00	Cover Fan	TS 816
2105700	28.80	Panel Floppy Cover	TS 802H (Plastic)

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PART PRICE DESCRIPTION
NUMBER

MISCELLANEOUS SPARES

2101600	64.80	Chassis Mounting	TS 806/806H
2101900	5.88	Panel Cover Hard Disk	TS 806
2103500	19.98	Cover Top Power Supply	TS 802
2152800	6.72	Speaker (8 ohm) With Connector	
2150100	41.70	Filter A.C. Line SAE HP2-2	
2001300	2.88	Bail Mount Enclosure	
2101900	5.88	Panel Shield Winchester Disk	TS 806
2204900	2.89	Shield Board	TS 816
2225200	31.80	Bracket	TS 816/40 WDC

LABELS/LOGO'S

2105000	1.50	Label Logo Plastic "TeleVideo" Systems	
2191300	2.40	Label Logo Plastic "TeleVideo" Printer	
2105104	.72	Label Keyboard	TS 800A
2105105	.72	Label Keyboard	TS 802
2105106	.72	Label Keyboard	TS 802H
2208500	.72	Label Keyboard	TS 1602G
2208600	.72	Label Keyboard	TS 1602GH
2105300	.96	Label Back Panel "RS 232"	TS 806-806/20
2105301	.96	Label Back Panel "Terminal"	TS 806-806/20
2154402	1.50	Label Back of Unit	TS 800A
2142900	.90	Label S1	TS 800A
2142901	.90	Label S2	TS 800A

BOXES/PACKING MATERIAL

2208800	25.00	Carton Inner	Shipping TS 802/TS 1602G
2143600	16.86	Carton Outer	Shipping TS 802/TS 1602G
2143700	20.52	Carton Inner	Shipping TS 806
2208900	31.98	Carton Outer	Shipping TS 806
2143800	26.22	Carton Inner	Shipping TS 816
2209000	31.98	Carton Outer	Shipping TS 816
2185700	3.18	Corner Blocks	Shipping Carton
2208200	16.00	Carton	Shipping Hard Disk
2214401	12.00	Formed Foam	TS 806
2237300	10.00	Formed Foam	TS 800A

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MINIMUM ORDER \$500.00

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SPARE PARTS KITS PRICE

2280700 Kit, Spare Parts, Power - Video Module TS 800A \$ 153.28

2042200 2N3906 Vertical Amplifier
2046500 2N3904 Vertical Drive
2200000 2N4401 Horizontal Drive
2047100 2N5551 Reference Amplifier
2046700 KTC1627A 75Volt Regulator
2201400 DS135D/IN391
2047500 IN914
2200800 Yoke Deflection With Connector
2201200 Transformer Horizontal Drive
2200900 Linearity Coil 5.40uh
2201300 Transformer Flyback (High Voltage)
2201000 Inductor 27uh
2126900 Voltage Regulator LAS 16CB 2A/13.8Volts
2186200 Resistor CF 390 Ohms 1/2Watt 5%
2201600 IN759A Zener Diode
2199300 Capacitor 220uf 16Volt Electrolytic
2197300 Capacitor .1uf 600Volt Mylar
2047300 2SC2233 MJE13006
2280800 Diode 30S2 I.R. 3 Amp
2126600 Voltage Regulator LAS L1405 3 Amp 5 Volt

2000700 Kit, Spare Parts, Logic Bd 8 Bit Systems \$ 300.12

2042600 26LS32 RS422 interface
2042400 26LS31 RS422 interface
2050600 SIO/2 serial communications chip
2050800 CTC counter timer chip
2051000 CPU Z80A central processor unit
2051200 DMA direct memory access chip
2051600 64K dynamic RAM (4 each)
2029200 75188N
2029400 75189N

2228400 Kit Data Cables TS 816's \$ 235.72

2006201 Logic to Tape/Logic to 816U
2006400 Logic to Winchester 816
2006801 816/40 WDC To Winchester
2006601 816 Parallel Printer to Logic
2007002 816/40 logic to WDC
2006204 816/40 Logic to Tape/Logic to 816U
2006200 816/40 Logic to WDC
2006404 816/40 WDC to Winchester
2224300 816/40 Parallel Printer

2203000 Kit, Spare Parts Logic bd FDC \$ 199.59

2040200 WD2143-01 four phase clock logic
2040400 WD1691 floppy support logic
2040600 FD1793-02 (93816 fair amd) floppy controller

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*****
                SPARE      PARTS      KITS                PRICE
*****

2270800    Kit Data Cables User Stations and TS 806's      $ 223.08
    2006800      802H WDC To Winchester
    2007001      802H Daughter Board To WDC
    2007300      802 Daughter Board To Floppy
    2006100      802 Logic to Daughter Board
    2135700      1602G Logic to Graphics Board
    2006900      802H Daughter Board To Floppy/ WDC To Winchester
    2006501      806 RS422 to Logic
    2006901      806 Logic To Floppy/ WDC To Winchester
    2007000      806 Logic To WDC
    2006801      806 WDC To Winchester
    2006600      806 Parallel Printer

2202800    Kit, Spare Parts, Mechanical TS802/800A          $ 90.88
    2005700      cord for keyboard
    2223700      3 amp 125V fuse (25 each)
    2199400      keyswitch
    2096800      10 position side dip switch
    2223300      1 amp 250V fuse (25 each)
    2182100      RS232 connector
    2097900      RJ-11 connector
    2098000      RS422 connector
    2100500      connector shroud

2202900    Kit, Spare Parts Logic bd WDC                    $ 244.80
    2056200      parallel converter
    2056400      MFM converter
    2056600      AM detector
    2056800      CRC generator/checker
    2057000      parallel to serial converter
    2057200      delay line

2252000    Kit, Graphics Board                              $ 401.40
    2057400      IC Gate Array Graphics/1603
    2139800      IC 7220 Graphic Display Controller
    2139200      IC Dynamic RAM 4116 16K x 1 (120ns) [4 each]

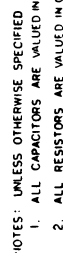
2252100    Kit, Spare Parts, Logic Board 16 Bit Systems     $ 703.50
    2051600      64K dynamic RAM (.4 each)
    2029200      75188N
    2029400      75189N
    2042600      26LS32 RS422 interface
    2042400      26LS31 RS422 interface
    2054000      IC 8284A Clock Generator
    2054200      IC 8288 Bus Controller
    2054400      IC P8088 CPU IAPX 88/10
    2054600      IC 8274 USART
    2054800      IC 8254 Program Interval Timer
    2055000      IC 8259A Priority Interrupt Controller
    2055200      IC 8089 IOP

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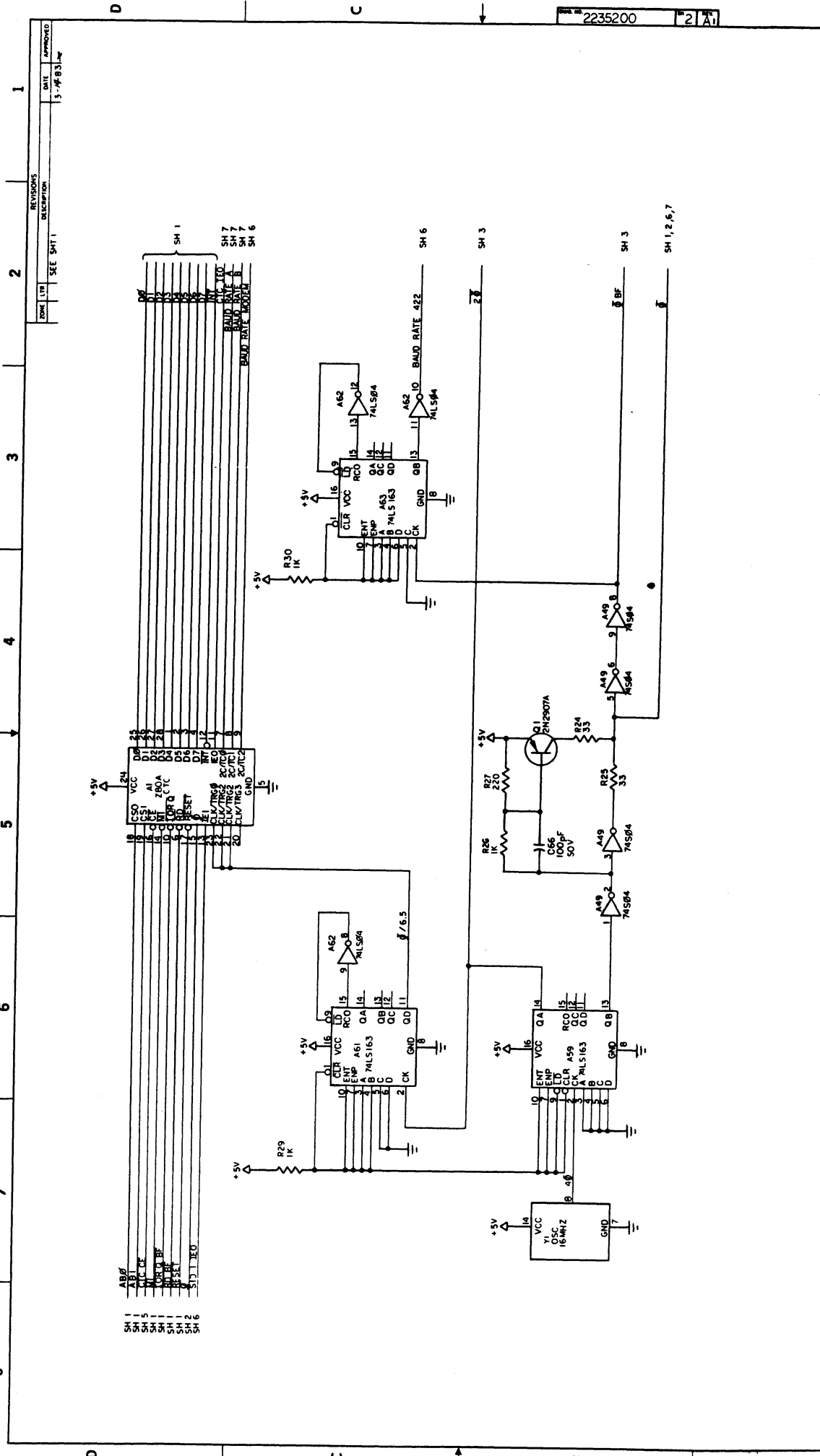

C: DRAWINGS

This section contains board assembly drawings and logic diagrams. When ordering parts, use the component type or value shown in the diagrams to refer to the TeleVideo part number listed in the Appendix B Spare Parts Price List. The prices listed in the Spare Parts Price list are for estimating only.





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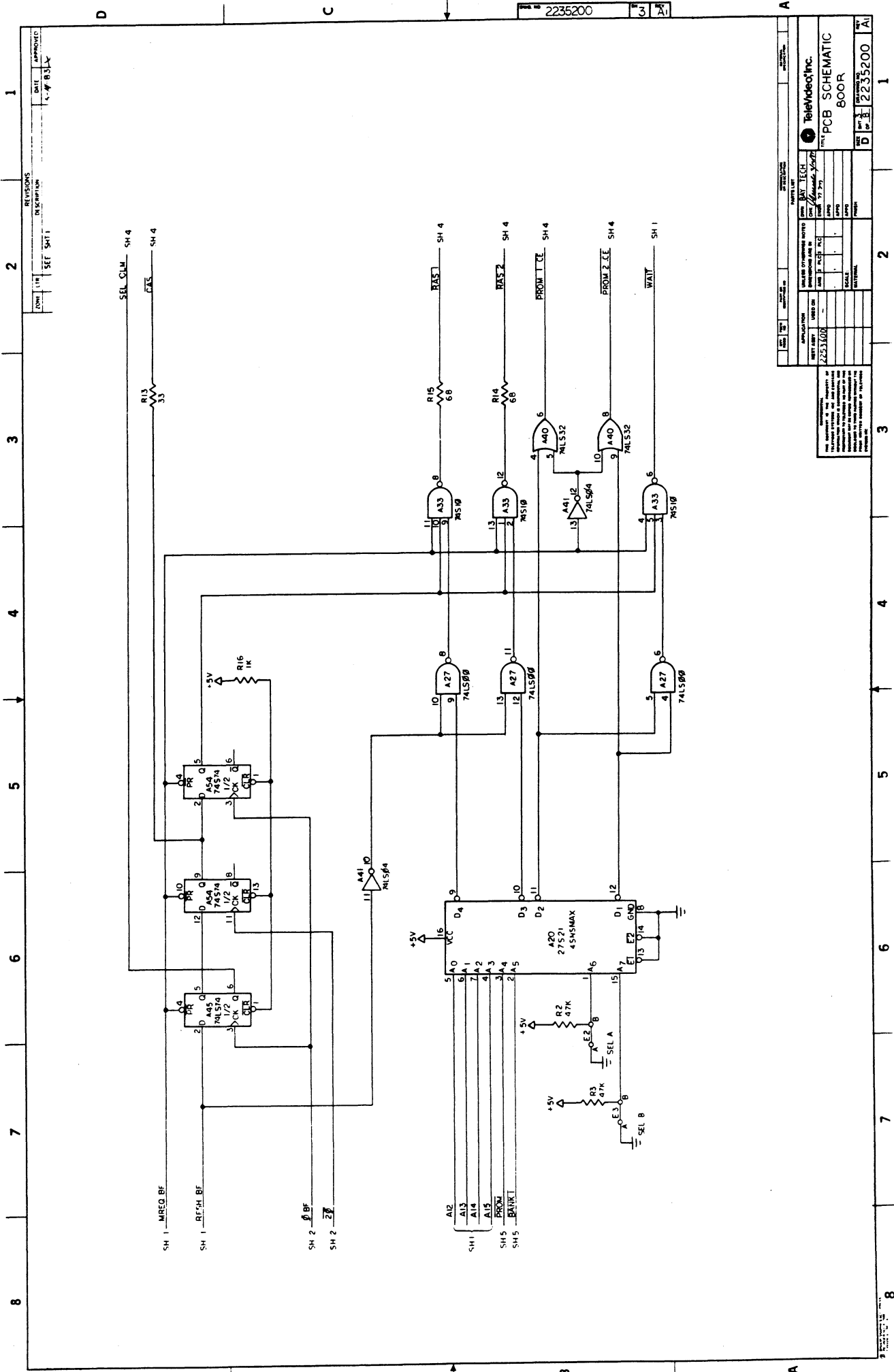
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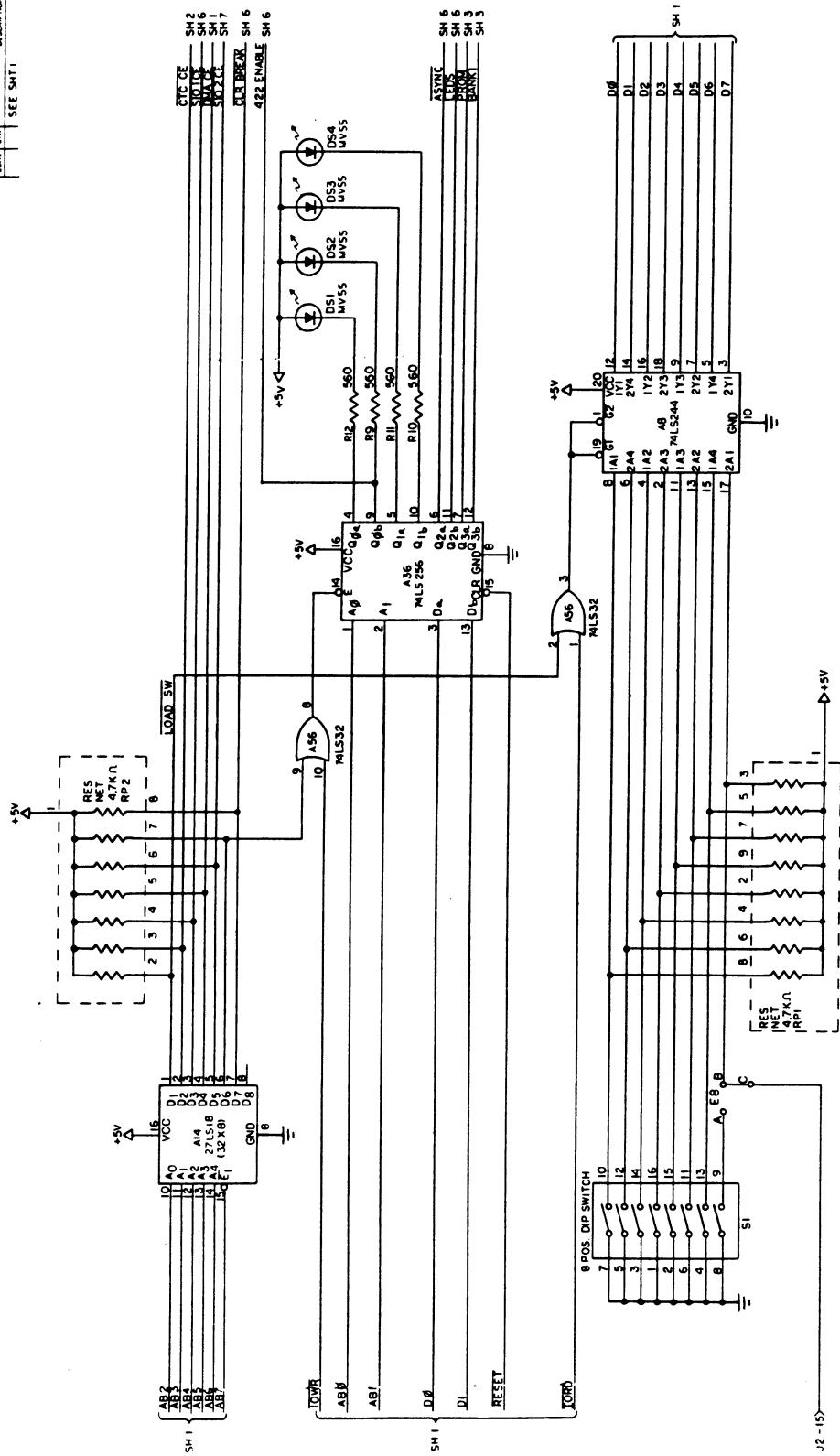


REVISIONS		DATE	APPROVED
1	SEE SH 1	6-8-83	BSL

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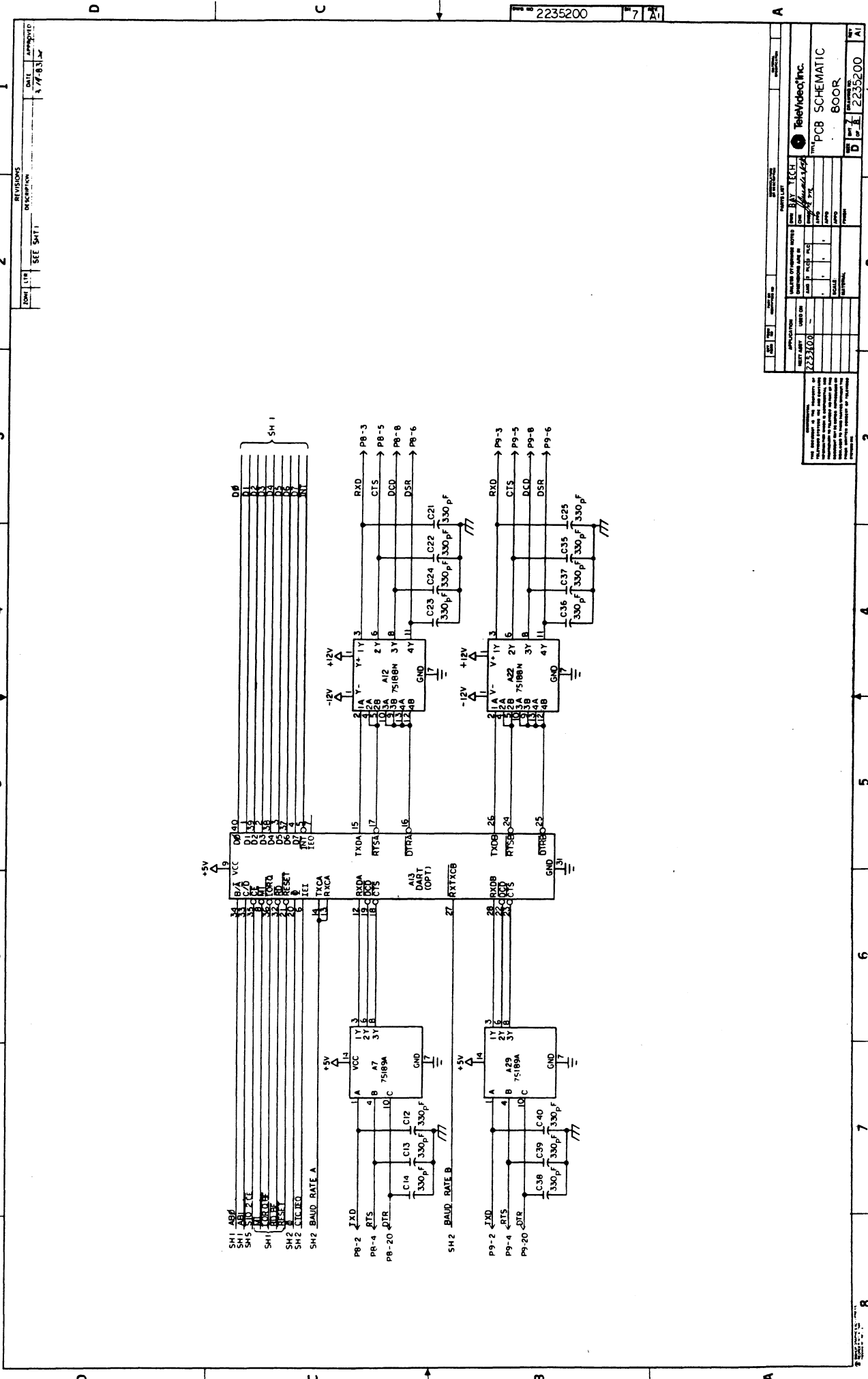


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THE FOLLOWING IS THE HISTORY OF THE ABOVE DESCRIBED CASE AS REPORTED BY THE ABOVE NAMED PERSONS TO THE ABOVE NAMED AGENTS OF THE FBI ON THE DATE AND AT THE PLACE INDICATED ABOVE:



REVISIONS		DATE	APPROVED
1	SEE SH-1	1/7/83	

2235200 7 A1

PARTS LIST		QUANTITY	DESCRIPTION
1	75189A	3	COMPARATOR
2	330pF	10	CAPACITOR
3	330uF	10	CAPACITOR
4	10K	10	POTENTIOMETER
5	100K	10	POTENTIOMETER
6	1M	10	POTENTIOMETER
7	10M	10	POTENTIOMETER
8	100M	10	POTENTIOMETER
9	1M	10	POTENTIOMETER
10	10M	10	POTENTIOMETER
11	100M	10	POTENTIOMETER
12	1M	10	POTENTIOMETER
13	10M	10	POTENTIOMETER
14	100M	10	POTENTIOMETER
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17	100M	10	POTENTIOMETER
18	1M	10	POTENTIOMETER
19	10M	10	POTENTIOMETER
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1	75189A	3	COMPARATOR
2	330pF	10	CAPACITOR
3	330uF	10	CAPACITOR
4	10K	10	POTENTIOMETER
5	100K	10	POTENTIOMETER
6	1M	10	POTENTIOMETER
7	10M	10	POTENTIOMETER
8	100M	10	POTENTIOMETER
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1	75189A	3	COMPARATOR
2	330pF	10	CAPACITOR
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4	10K	10	POTENTIOMETER
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TeleVideo, Inc.
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1	75189A	3	COMPARATOR
2	330pF	10	CAPACITOR
3	330uF	10	CAPACITOR
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5	100K	10	POTENTIOMETER
6	1M	10	POTENTIOMETER
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1. All components are to be specified by the manufacturer's name, part number, and value. 2. All components are to be specified by the manufacturer's name, part number, and value. 3. All components are to be specified by the manufacturer's name, part number, and value. 4. All components are to be specified by the manufacturer's name, part number, and value. 5. All components are to be specified by the manufacturer's name, part number, and value. 6. All components are to be specified by the manufacturer's name, part number, and value. 7. All components are to be specified by the manufacturer's name, part number, and value. 8. All components are to be specified by the manufacturer's name, part number, and value. 9. All components are to be specified by the manufacturer's name, part number, and value. 10. All components are to be specified by the manufacturer's name, part number, and value. 11. All components are to be specified by the manufacturer's name, part number, and value. 12. All components are to be specified by the manufacturer's name, part number, and value. 13. All components are to be specified by the manufacturer's name, part number, and value. 14. All components are to be specified by the manufacturer's name, part number, and value. 15. All components are to be specified by the manufacturer's name, part number, and value. 16. All components are to be specified by the manufacturer's name, part number, and value. 17. All components are to be specified by the manufacturer's name, part number, and value. 18. All components are to be specified by the manufacturer's name, part number, and value. 19. All components are to be specified by the manufacturer's name, part number, and value. 20. All components are to be specified by the manufacturer's name, part number, and value.

